Reply Report of Dr. Kevin Neels

To Accompany UPS Reply Comments

In Docket No. RM2016-2

March 25, 2016

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## I. Introduction

On October 8, 2015, I submitted an initial report to accompany UPS Proposals One, Two, and Three.[1] In that report, I presented analysis in support of the aforementioned UPS Proposals. In support of Proposal One, I argued that The United States Postal Service's inframarginal costs are variable costs that can be readily identified and attributed to products in a principled and reasonable manner. With respect to Proposal Two, I presented strong statistical evidence of a systematic bias in current Postal costing procedures toward overstating fixed costs and thus under-attributing costs to products. Finally, in support of Proposal Three, I presented arguments in favor of increasing the appropriate share of the Postal Service's institutional costs that must be covered by Competitive Products.

The Postal Regulatory Commission ("the Commission") subsequently opened Docket RM2016-2 to consider Proposals One and Two, and stated its intent to consider Proposal Three in a separate docket after the question of adoption of Proposals One and Two is resolved.[2] On January 25, 2016, several parties submitted comments on the UPS Proposals, and in some cases, on my report. In particular, Professor Michael Bradley submitted comments on behalf of the United States Postal Service, while Professor John C. Panzar, Dr. T. Scott Thompson, and Mr. Sander Glick all submitted comments on behalf of Amazon Fulfillment Services, Inc.[3]

In this reply report, I respond to the comments and criticisms made in these reports. I begin by explaining why the textbook-driven positions of Professors Bradley and Panzar ignore important implications for the existence of private-sector competition – implications that the Commission cannot ignore. With respect to Proposal One, I demonstrate that the question of cost attribution faced by the Postal Service is neither as rare nor as difficult as Professor Bradley believes it to be.

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[1]   "Report of Dr. Kevin Neels Concerning UPS Proposals One, Two, and Three." October 8, 2015. UPS-RM2016-2/1 ("Neels").

[2]   Postal Regulatory Commission Order No. 2793. October 29, 2015

[3]   Michael D. Bradley. "Analysis of UPS Proposals One and Two, and the Supporting Report of Dr. Kevin Neels." January 25, 2016 ("Bradley"); "Declaration of John C. Panzar on Behalf of Amazon Fulfillment Services, Inc." January 25, 2016 ("Panzar"); "Declaration of T. Scott Thompson on Behalf of Amazon Fulfillment Services, Inc." January 25, 2016 ("Thompson"); "Declaration of Sander Glick on Behalf of Amazon Fulfillment Services, Inc." January 25, 2016 ("Glick").

I then show that inframarginal costs can be measured and assigned to products with an acceptable degree of precision.  Finally, I present updated estimates of the impact of Proposal One to address some of the methodological issues raised by Professor Bradley and to incorporate new information provided by the Postal Service relating to the computation of inframarginal costs.

Moving to Proposal Two, I review the robust statistically significant results relating to hidden variable costs, and I explore in more detail the basis under current Postal Service costing procedures for classifying these costs as fixed.  I address the criticisms offered by Professor Bradley, Dr. Thompson, and Mr. Glick, demonstrating that they are vague, speculative, incorrect, or have no meaningful impact on my results. I present a simplified set of recommendations that reflects the few valid comments and recognizes the Commission's need to reconcile my results with existing costing models.

## II. Professors Bradley and Panzar Fail to Address the Long-term Implications of their Positions for Private Sector Competition.

Professors Bradley and Panzar ignore PAEA's requirement that the Commission ensure that the Postal Service compete with private sector companies on a level playing field.[4]  They fail to acknowledge the customer benefits provided by vigorous private sector competition and the role it plays in assuring dynamic efficiency and innovation, or the long term implications of their positions for the preservation of vigorous private sector competition.  They also fail to consider the effects their recommendation might have in a real world environment characterized by imperfectly measured costs and complex and partially conflicting goals and objectives.

Professors Bradley and Panzar both warn that setting prices too far above marginal costs could encourage inefficient entry into the market.[5]  Professor Panzar further argues that if in fact the Postal Service's incremental cost on competitive products is lower than the unit cost faced by a

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[4]    Postal Accountability and Enhancement Act," Public Law 109-435, U.S. Government Printing Office, December 19, 2006, Sec 3633.(a).

[5]    Panzar, p. 21; Bradley p. 12.

private sector competitor, then the efficient outcome would be for the Postal Service to drive private competitors from the market and assume the status of a monopolist.[6]

Professor Panzar's argument about the efficiency of the "monopoly industry configuration" rest upon an incomplete and incorrect definition of efficiency that focuses exclusively on marginal cost at the prevailing level of volume while ignoring the level and location of each firm's overall marginal cost curve. In other words, it confuses where the Postal Service and its private sector competitors are currently operating on their declining marginal cost curves with the level and shape of those curves. It is possible to envision a situation in which one firm is more efficient than its competitor in the sense that at any given level of volume it enjoys a lower marginal cost. If, however, the two firms produce very different levels of output, and hence operate at different locations on their respective marginal cost curves, it is possible that the more globally efficient firm might nonetheless have higher marginal costs. Such an outcome would be unlikely to sustainably occur in a fully competitive market, in which a firm with an overall cost advantage can be expected (all else equal) to gain market share. Such a situation could certainly arise, however, in a market distorted by statutory or regulatory constraints. The Postal Service's statutory monopoly over letter mail guarantees that organization a volume of mail that its private sector competitors are unlikely to be able to achieve despite their best efforts. To the extent that the Postal Service currently enjoys lower marginal costs than its private sector competitors, this fact would most likely be attributable to the fact that as a result of its statutory monopoly it handles a much larger amount of volume. If the Postal Service and its private sector competitors all handled the same volumes and operated at the same locations on their respective marginal cost curves, it is very unlikely that they would all have the same marginal cost, and it is questionable whether the Postal Service would turn out to have the lowest marginal cost.

Professor Panzar's argument is also short-sighted in that it conceives of efficiency as a static and immutable concept. In particular, the validity of Professor Panzar's scenario where a monopoly for delivery of competitive products would be the most efficient outcome rests upon the unstated and implausible assumption that the efficiency of the Postal Service is unaffected by the degree of competition to which it is exposed. There is in fact an influential body of economic literature that finds that the decrease in competitive pressures that accompany an increase in industry concentration – up to and including monopolies – has adverse effects for the remaining

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6    Panzar, pp. 26 - 28.

monopolist's costs.[7]  A related body of literature has established that a lack of competitive pressure reduces the incentives for innovation, implying increased costs and an overall reduction in consumer welfare in the future.[8]

Recent experience in the parcel delivery industry provides examples of innovations that have originated in one or more private sector competitors before eventually being implemented by the Postal Service.  For example, the Postal Service began using mobile data collection devices and developing a delivery confirmation system "similar to those employed by private parcel delivery services" in 1998, some 7 years after UPS introduced similar capabilities.[9]  Similarly, after years in development, UPS first tested its dynamic route optimization software in 2010, with the Postal Service following with its own pilot 4 years later.[10]  These and other examples provide empirical support for the notion that competition is a driving force for innovation in delivery services, and that loss of competition could entail significant inefficiencies over time.

Professor Panzar's arguments regarding the efficiency of incremental cost pricing and the unfortunate consequences likely to result from imposing any requirements on competitive product prices other than coverage of incremental costs also rest upon a number of unstated and unsupported assumptions.

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[7]   See, for example, Harvey Leibenstein. 1966. *Allocative Efficiency vs. 'X-Efficiency'*. The American Economic Review 56 (3). 392-415, at 392, arguing that "microeconomic theory focuses on allocative efficiency to the exclusion of other types of efficiencies that, in fact, are much more significant in many instances"; Comanor, William S., and Harvey Leibenstein. *Allocative Efficiency, X-efficiency and the Measurement of Welfare Losses*. Economica 36.143 (1969): 304–309.

[8]   See, for example, Acs, Zoltan J., and David B. Audretsch. *Innovation in Large and Small Firms: An Empirical Analysis*. The American Economic Review 78.4 (1988): 678–690; Geroski, P. A. *Innovation, Technological Opportunity, and Market Structure*. Oxford Economic Papers 42.3 (1990): 586–602; Gilbert, Richard J., and Steven C. Sunshine. 1995. *Incorporating Dynamic Efficiency Concerns in Merger Analysis: The Use of Innovation Markets*. Antitrust Law Journal 63 (2). 569–601

[9]   See *U.S. Postal Service to Deploy 300,000 + Mobile Data Collection Units From Hand Held Products*, PR Newswire Association LLC (1997), http://www.thefreelibrary.com/U.S.+Postal+Service+to+Deploy+300,000%2B+Mobile+Data+Collection+Units...-a019709351; Mallis, Laurie, *Birth of DIAD*, UPS, 12/07/2009, http://blog.ups.com/2009/12/07/birth-of-the-diad/.

[10]  See *Toward dynamic routing*, USPS LINK, 3/28/14, https://liteblue.usps.gov/news/link/2014/03mar/news31s1.htm; *ORION Backgrounder*, https://www.pressroom.ups.com/pressroom/ContentDetailsViewer.page?ConceptType=Factsheets&id=1426321616277-282;

The first such assumption is that the Postal Service and the Commission have a perfect understanding of the Postal Service's cost structure. In Professor Panzar's ideal world, fixed costs, marginal costs, and incremental costs are all known with perfect certainty. They are represented merely as symbols in some abstract mathematical equation that be readily solved to compute the optimal outcome.

Virtually anyone who has spent time wandering through the corridors, basements and sub-basements of the Postal Service's costing procedures would have to admit that our knowledge and understanding of that organization's cost structure is far from perfect. At their best, the Postal Service's costing studies are based upon reasonably sophisticated econometric studies whose conclusions are subject to some degree of statistical uncertainty. Some of these studies are relatively recent; others are quite ancient. However, there are many large pools of postal costs that have never been subjected to any sort of rigorous empirical study. In many areas estimates of marginal and incremental costs are based on assumptions, analogies or simple rules of thumb. Key costing parameters are derived from random samples subject to sampling variation. Any dispassionate observer would have to conclude that at best the available estimates of marginal and incremental costs are just that – estimates that are subject to a good deal of uncertainty and imprecision.

Acknowledging the presence of measurement error in the cost estimates underlying Professor Panzar's proposed regulatory price floor places that floor and the efficiency gains he argues will flow from its adoption in a somewhat different light. If Postal Service cost estimates are centered in their true values and follow a normal distribution, there would be a 50/50 chance that true incremental costs would in fact be *higher* than a regulatory price floor based on imprecise estimates, and that prices set at the floor would in fact imply subsidization of the product or products in question.[11]

Apart from the degree of imprecision or uncertainty associated with the Postal Service's cost estimates, one also need to consider the possibility of bias. In my opening report I presented the results of a series of statistical tests indicating a widespread and quantitatively significant

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[11]   This implies of course that there is an equal chance that true incremental costs are lower than a regulatory price floor. However, the nature of the risks is asymmetric in that prices should exceed the price floor by some amount anyway if competitive products are contributing to covering the Postal Service's common costs.

tendency for Postal Service costing procedures to understate the extent to which costs vary with volume. These results certainly suggest at least the possibility that the Postal Service's estimates of marginal and incremental costs might be not only imprecise, but also biased downward. Establishing a price floor based upon understated estimates of the relevant cost parameters would free the Postal Service to pursue unprofitable growth, and to drive more efficient rivals from the market, to the eventual detriment of consumers.

The likely effects of measurement errors in the available estimates of incremental costs will depend upon the nature of the Postal Service's objective function. Professor Panzar states in his report that a price floor for competitive products based on their incremental costs frees the Postal Service to set prices in a contribution maximizing manner.[12] He refrains, however, from arguing that this is in fact what the Postal Service is doing or will do. If the Postal Service were in fact focused on the goal of maximizing the contribution it earns on sales of competitive products this focus would reduce the risks of cross-subsidization that might otherwise be associated with a regulatory price floor based on understated cost estimates. In such a case prices would be set at a level above the regulatory cost floor, and cross-subsidy would occur only if the margin between prices and the regulatory cost floor were small relative to the degree to which costs are understated.

As Professor Panzar's cautious wording suggests, however, one cannot simply assume that the Postal Service is attempting to maximize the contribution earned on competitive products. A private for-profit company selling products below cost could be expected fairly quickly either to be driven from business, or to be disciplined by its shareholders. The Postal Service, however, is not such a company. The Postal Service, like many state-owned-enterprises, has "the incentive to sacrifice profit to expand its scale," in part due to statutory mandates and policy goals that diverge from profit maximization.[13] Moreover, "[m]anagers of [state-owned enterprises] ... often

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[12] "Above these price floors, a regulated firm like the Postal Service should be allowed to recover the shortfall between incremental costs and total costs by setting markups that, in the judgment of Postal Service management, maximize the total contribution generated by the Postal Service's outputs, constrained only by the maximum rate standards and restrictions on discrimination that legislators and regulators set." Panzar, p. 3.

[13] J. Gregory Sidak, *Maximizing the U.S. Postal Service's Profits from Competitive Products*, 11 J. COMPETITION L. & ECON. 617, 662 (2015); *see also* David E.M. Sappington & J. Gregory Sidak, *Competition Law for State-Owned Enterprises*, 71 ANTITRUST L.J. 479 (2003); David E.M. Sappington

have considerable interest in expanding the scale or scope of their activities, in part, because a manager's abilities may be inferred from the size of the operations that he or she oversees."[14] The Postal Service's incentive compensation even "explicitly rewards managers with bonuses that are tied to measures of scale, including deliveries per hour."[15] In other words, the Postal Service's objective function likely maximizes some weighted average of profit and scale, rather than profit alone.[16] That pressure to increase scale at the expense of profit creates a strong incentive for the Postal Service to attempt artificially to increase its downward pricing flexibility for competitive products by under attributing costs. While the Postal Service is obviously under some considerable pressure to generate enough revenue to cover its operating costs, it lacks a set of active shareholders demanding that it earn a full return on its capital assets. As a long-standing public entity operating in daily contact with citizens and businesses, the Postal Service might also believe that if it were to encounter truly serious financial difficulties it could expect to receive some form of legislative relief.[17] Such relief could take the form of authorization to impose permanent increases in the rates charged to market dominant mailers, relief from obligations to retirees, or potentially even provision of outright subsidies.[18]

In recent years the Postal Service has indicated on numerous occasions that it regards expansion of its parcel business to be a major strategic imperative. For example, in its 2015 10-K filing the Postal Service states that expecting "continued migration to electronic communication and

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& J. Gregory Sidak, *Are Public Enterprises the Only Credible Predators?*, 67 U. Chi. L. Rev. 271, 285–86 (2000) (arguing that a public enterprise has a greater incentive than a private firm to engage in predatory pricing).

[14] Sappington & Sidak, *Competition Law for State-Owned Enterprises*, *supra* note 13, at 500.

[15] Sidak, *supra* note 13, at 662; *see also* National League of Postmasters, NPA FY2014 Summary of Changes 1 (2014), http://www.postmasters.org/educational/pfp/NPA%20FY2014.pdf.

[16] For a formal model of an SOE's maximization of a weighted objective function consisting of profit and output (the most tractable measure of scale in a multiproduct firm), see Sappington & Sidak, *Competition Law for State-Owned Enterprises*, supra note 13.

[17] See, e.g., U.S. Postal Service, Annual Report (Form 10-K) at 32 (Dec. 5, 2014) (noting that "it is unlikely that in the event of a cash shortfall, the Federal Government would allow us to significantly curtail or cease operations").

[18] See Statement Of Megan J. Brennan Postmaster General And Chief Executive Officer United States Postal Service Before The Senate Homeland Security And Governmental Affairs Committee. January 21, 2016, in which some of these alternatives are discussed.

transactional alternatives,"[19] it has "focused our efforts on providing new services to enhance the value of mail, capitalizing on the growth in e-commerce and implementing marketing campaigns to grow our Shipping and Packages business."[20] One might suspect that faced with a pressing need to grow a long term alternative to its declining traditional businesses, the Postal Service may be pursuing growth at the expense of profitability. At a minimum, one might expect that given the perceived strategic importance of expanding its parcel business the Postal Service might be focused on maximizing parcel volume or growth (at least subject to cost coverage constraints), rather than the contribution earned on these sales.

Why might the Postal Service doggedly pursue growth in its parcel business without trying to maximize its contribution to the organization's bottom line? There are a number of possible answers to this question. First, it is possible that the Postal Service doesn't fully understand the profitability of this business. It is easy to see the revenues gains generated by the new business; the cost impacts are harder to discern. Second, it is possible that the Postal Service may believe that the new business, even if currently unprofitable or marginally profitable, will become more profitable at some point in the future. Perhaps it expects eventually to achieve some economies of scale comparable to what it has traditionally experienced in its letter business. Or, perhaps it simply *hopes* that if it gains enough volume it will be able somehow to figure out how to make it all work. A third possibility is that the Postal Service may anticipate that at some future point when it might be in dire financial straits, and be seeking some form of legislative and/or regulatory relief it will enjoy the support of large customers who have come to depend upon its bargain priced parcel services, and that with their help it will be more likely to be provided with the resources it needs to maintain its operations.

The less committed the Postal Service might be to maximizing the contribution earned on its competitive products, the more important it is to set price floor in a manner that assures that prices will exceed actual incremental costs, and the more damaging to competition failure to do so will be. Permitting a Postal Service that is potentially under-motivated to measure its costs accurately or to operate its business profitably, and that expects in times of great need to obtain regulatory and legislative relief in the form of removal of financial obligations, greater freedom to increase prices for its monopoly services, or even explicit subsidies, to set competitive product

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[19]   2015 10-K, page 32.

[20]   2015 10-K, page 16.

prices based on uncertain, imprecise and potentially biased cost estimates could cause substantial harm to competition in parcel markets. Such a world is far removed from the idealized world of economic theory from which Professor Panzar draws his conclusions about how best to promote efficiency. However, regulators, mailers and competitors need to craft and live with policy for the real world.

## III. Response to Comments on Proposal One

The discussion of Proposal One in my initial report established that inframarginal costs are variable costs and that they can be readily calculated using existing Postal Service models.[21] I discussed a simple method, consistent with a conceptual framework known as the Shapley Value, by which those costs can be attributed to products. Professor Bradley has offered a number of comments on Proposal One regarding the alleged uniqueness of the cost attribution problem faced by the Postal Service, possible problems in using existing Postal Service machinery to quantify and attribute inframarginal costs, and criticisms of the specific calculations of inframarginal costs presented in my initial report. In this section of my report I explain why many of these criticisms are incorrect or misguided. I also revise my calculation of inframarginal costs, taking into account elements of Professor Bradley's critiques of the McBride methodology I initially used, but also correcting apparent errors and inconsistencies in Professor Bradley's own calculations.

### A. THE PROBLEM OF COST ATTRIBUTION IN THE POSTAL SERVICE IS NEITHER AS UNIQUE NOR AS COMPLEX AS PROFESSOR BRADLEY MAKES IT OUT TO BE

Professor Bradley begins his report with a lengthy discussion of the cost characteristics of the Postal Service. In his view, three factors play key roles in defining the cost structure of this organization: the fact that it is a multiproduct firm; that fact that it has many common costs; and the fact that it is a "network" industry," a term that he uses to describe an industry in which there are efficiencies to be gained from producing products together.[22] Clearly, these three characteristics are closely related. One would expect that the fact that there are efficiencies to be

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[21] Neels, pp. 14-30.

[22] Bradley, p. 3.

gained from producing products together has something to do with why a firm is a multi-product firm.

Professor Bradley repeatedly emphasizes the unique nature of the Postal Service: "Because of the unique economics of the Postal Service, standard single-product firm costing methods are inapplicable."[23]  He warns repeatedly against the dangers of applying "single-product cost concepts"[24] to the Postal Service:

> These cost characteristics reveal that Postal Service has a relatively complex costing structure and its costs cannot be accurately measured through the use of simple single-product firm cost measures.  To accurately measure postal product costs, the relevant cost measures must reflect the economics of a multiproduct firm.[25]

> Erroneously applying single-product firm concepts to a multiproduct firm will lead to mis-measured costs and faulty inferences about those costs.[26]

> Consequently, there are different product cost measures in a multiproduct firm than there are in a single-product firm.[27]

> A fourth difference between the costs in a multiproduct firm and a single-product firm is the fact that scalar quantities such as average variable cost, average fixed cost, and average total cost are meaningless in the multiproduct firm.[28]

I do not agree with Professor Bradley's assertion that these characteristics make the Postal Service's economics "unique."[29] Many, if not most firms – and certainly most large firms – are, in

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[23]  Bradley, p. 3.

[24]  Bradley, p. 4.

[25]  Bradley, p. 4.

[26]  Bradley, p. 4.

[27]  Bradley, p. 6.

[28]  Bradley, p. 9.

[29]  I will concede that there are other characteristics of the Postal Service not cited by Professor Bradley that make it somewhat unique – its enormous size, for example, its status as a (mostly) self-funded

fact, multiproduct firms. I will admit that one rarely encounters a firm with a set of product offerings broad enough to encompass, say, high technology fighter jets, fine dining, and athletic socks. Most multiproduct firms – like the Postal Service – produce a set of closely related products. The key differentiating characteristics that Professor Bradley asserts makes the Postal Service unique – the fact that it sells multiple products, has many common costs and is a network industry – apply with equal force to virtually all major transportation companies, including Class One Railroads, major airlines and less-than-truckload trucking companies (not to mention UPS and FedEx). In addition, in my experience most manufacturers are multiproduct firms, selling a range of products that often rely upon similar inputs or that incorporate common components and subassemblies. Consider, for example, auto manufacturers. Most such manufacturers produce a range of different products, often including multiple types of passenger cars and trucks. Major components and subassemblies – such as chassis and engines – are frequently shared across multiple models. Consider also petroleum refining. Refiners produce a wide range of individual products, including aviation fuel, gasoline, diesel fuel, bunker oil, lubricants, and other petroleum products using a highly integrated production process involving multiple shared vessels and processing units. This list of counter examples could easily be lengthened. In my experience it is rare that one truly encounters a large organization that produces literally only a single product.

Because multiproduct firms are in fact very common, the challenges that Professor Bradley describes are not unique but rather have been frequently confronted, and there are well accepted, workable ways of meeting these challenges. One of those approaches – activity based costing – is used both by the Postal Service and by UPS.[30] Activity based costing procedures break the total costs of an organization down into a set of relatively homogenous pools related to specific production steps or processes. The costs included in each of these pools are then assigned to the individual products produced by the organization based upon the extent to which each uses or relies upon the activity generating the costs contained in that pool. Summing across the

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  government enterprise, and the fact that it enjoys a statutory monopoly over a large portion of its business.

[30] See, e.g. "United Parcel Service, Inc.'s Response to Chairman's Information Request No. 4," January 8, 2016, ("ChIR 4 Response") p. 1; United States Postal Service Office of Inspector General, "Postal Service Product Costing Methodologies Management Advisory Report," April 11, 2013, p. 4.

various cost pools, one can then calculate workable estimates of the costs incurred in the production of the various products sold by the organization.

Professor Bradley argues that concepts such as average variable costs are meaningless in a multiproduct firm because "there is no way to construct a meaningful single measure of output to serve as the denominator."[31] Within a well-defined activity-based cost pool, however, organizations routinely identify a meaningful single measure of the amount of activity taking place, and calculate a meaningful average cost per activity unit. In fact, as described in its response to a Chairman's Information Request in this docket, UPS, a multiproduct firm does just this.[32] Such activity measures are referred to as "cost drivers," and they are widely used both inside and outside the Postal Service.

Quoting himself, Professor Bradley describes the role played by cost drivers in an activity based costing system:

> Within each activity, there is an action performed on the mail piece and that action generates cost. The action might be the transport of a letter on a truck or its delivery to an address. Cost is increased when the number of such actions is increased; when more addresses are receiving mail, delivery costs rise. The quantity of each of these actions is measured by what is known as a "cost driver." Cost drivers are best understood by example: in highway transportation, the cost driver is the number of cubic foot-miles

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[31] Bradley, p. 9. In support of this assertion Professor Bradley cites an article published nearly thirty years ago: Baumol, William J., Panzar, John C., and Willig, Robert D., *Contestable Markets and the Theory of Industry Structure*, Harcourt Brace Jovanovich, 1987, at 47. It was around the time when this article was published that Robert S. Kaplan was publishing some of his ground-breaking work on activity-based costing. See, for example, Kaplan, R.S. and Cooper, R., *Make Cost Right: Make the Right Decisions*, Harvard Business Review, September–October 1988, or Kaplan, Robert S. and Bruns, *W. Accounting and Management: A Field Study Perspective*, Harvard Business School Press, 1987.

[32] "UPS then calculates the average cost per cost driver unit associated with each of these activities by dividing the total activity cost by the number of cost driver units associated with the activity." ChIR 4 Response, p. 2.

required to transport the mail; in mail processing, the cost driver is the number of sortations of mail required to get each piece en route to its proper destination.[33]

It is certainly possible to compute average cost per delivery, per sortation or per cubic foot mile, and the resulting quantities provide meaningful and valuable insights into the cost structure of the Postal Service. These are the kind of cost measures that multiproduct firms track and attempt to manage. Moreover, one can also compute by product the number of sortations required per piece, or the number of cubic foot miles per piece. The results of such calculations, once again, provide meaningful and valuable insights into the cost structure of the Postal Service and the costs of individual products. Despite Professor Bradley's protestations over the complexity and uniqueness of the Postal Service's cost structure, it is entirely possible within the context of an activity-based cost pool to move beyond marginal cost and compute meaningful measures of average variable cost per piece. Indeed, it is the ability to produce such measures that makes activity-based costing powerful and useful.

## B. INFRAMARGINAL COSTS CAN BE MEASURED WITH AN ACCEPTABLE DEGREE OF PRECISION

Inframarginal costs are no more difficult to measure than other costs used in the regulatory process. All such cost estimates are derived from costing models that both internal management and outside regulators have long found to be adequate to support informed decision making. For any given mathematical model of cost variability the computation of inframarginal costs is a straightforward mathematical exercise. In many cases there is no reason for concern about the accuracy of the constant elasticity approximation. If the entire component is judged to be variable, even if marginal cost declines with increases in output, the entire body of costs will be attributed to products, eliminating any concerns about potential errors in "extrapolating to the origin." In components in which a mathematical form other than a constant elasticity model is employed, it is again a mathematically straightforward task to compute inframarginal costs. While the full attribution of inframarginal costs may generate results that some parties question or object to, such outcomes are more likely to result from exposing to fresh examination long

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[33]  Bradley, p. 15, quoting Bradley, Michael D, Colvin, Jeff, Panzar, John C, "On Setting Prices and Testing Cross-Subsidy with Accounting Data," *Journal of Regulatory Economics*, Jul 1999, Vol. 16, No. 1, at 88.

held and rarely reevaluated assumptions buried in the bowels of Postal Service costing models than from the simple effort to calculate inframarginal costs.

## C.  INFRAMARGINAL COSTS CAN BE ASSIGNED TO PRODUCTS WITH AN ACCEPTABLE DEGREE OF PRECISION

One cannot question the suitability of using cost driver units to distribute inframarginal costs without simultaneously calling into question their suitability for attributing volume variable costs.  As I have discussed above, Professor Bradley argues at length that one's ability to attribute costs in a multi-product firm is fundamentally limited by the impossibility of measuring the relative cost generating properties of the various products sold by the firm.  Despite these arguments, however, the Postal Service routinely manages to do just that.  In every independent component containing volume variable costs the Postal Service has defined a cost driver that measures the relative cost-causing properties of its various products.  The methodology for distributing inframarginal costs to products under Proposal One would be carried out on a component-by-component basis.  The horizontal axis of the marginal cost curve in each component is thus denominated in cost driver units.  Just as cost drivers are currently used to distribute volume variable costs to products, they would be used under Proposal One to distribute inframarginal costs to products.

In my initial report, I discussed the concept of Shapley Values as support for distributing inframarginal costs.  Professor Bradley has offered several critiques of the implementation of this approach, which are either misguided or misleading, and which I will address here.

First, Professor Bradley repeatedly asserts that my use of the Shapley value is equivalent to Fully Distributed Costing.[34]  This assertion is simply untrue.  Proposal One deals only with inframarginal costs, and does not call for any allocation of fixed costs, a key characteristic of Fully Distributed Costing.[35]

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[34]   See Bradley, pp. 2, 26, 35, and 60.

[35]   As Figure 5 on p. 13 of my initial report illustrates, attributing inframarginal costs would still leave 22.5% of total USPS costs that are not distributed.  The assertion made by Professor Bradley is only true in his hypothetical example in which the hypothetical cost component contains no fixed costs.

At p. 11 of his report, Professor Panzar has similarly likened Proposal One to a *component-level* fully-distributed costing requirement for those components whose costs are estimated with a constant elasticity function.  However, full attribution at the component level is far from the fully distributed

Second, Professor Bradley has presented in his report an example purporting to document inaccuracies in my discussion of a Shapley Value-based method for allocating inframarginal costs.[36] He states that because in the presence of nonlinearities in a marginal cost function, a Shapley Value that is based on averaging all possible orderings of products does not yield an allocation of each component's inframarginal costs in the same proportions as those in which volume variable costs are distributed.[37] While he is correct, his insight is not new. I made this same point in my opening report – specifically, that a Shapley Value approach where products are the unit being ordered "can be shown to result in a slight over-attribution of inframarginal costs to small products, and a slight under-attribution to large products when compared with an approach that uses a more granular unit (such as a piece of mail or the unit of the cost driver) as the unit of analysis."[38] However, as the number of distinct items entering into a Shapley Value analysis increases, the difference in the presence of nonlinearities between the outcome of a "pure" Shapley approach and my proposed approximation based on an allocation in proportion to cost driver units decreases, eventually becoming trivially small.

Rather than "failure to actually implement a Shapley value analysis," as alleged by Professor Bradley, my approach does indeed yield the result of attributing inframarginal costs according to the distribution keys within each component, a result whose accuracy was also acknowledged by Dr. Panzar.[39] The criticisms offered by Professor Bradley appear to reflect a misunderstanding of the approach I proposed, which I will now clarify. In my initial report, I used a product-based ordering to demonstrate the concept of Shapley Values. However, I ultimately proposed a Shapley Value based approach that uses not products, but units of the cost driver, as the unit of

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    costing that the PRC has sought to avoid. In fact, several components are already fully attributed including component 165 (Rents) and component 236 (Depreciation – Building), both of which appear to be costs that are jointly incurred by several products.

[36] See Bradley, pp. 31-35.

[37] See Bradley, p. 32.

[38] See Neels, p. 26.

[39] See Panzar, p. 17: "In the current context, application of the Shapley method *indisputably* would have the effect of allocating the infra-marginal costs of each component in the same proportions as those in which volume variable costs are distributed." (emphasis added).

analysis.[40]  One important reason adopting this approach is that while the Shapley Value based approach to allocating inframarginal costs is order-neutral, it is not neutral with respect to changes in product definitions.

A simple adjustment to Professor Bradley's example illustrates these points clearly. In the revised example below I have divided product C into two products that are of roughly equal size.  Doing so has the effect of increasing the total attribution to the old product C and decreasing attribution to products A and B.  This result is demonstrated in Table R-1 below.  Note that, in contrast to the product-based approach, the Shapley Values based on units of the cost driver are not sensitive to the change in product definition.  The Commission has, in recent years, had to deal with several regulatory proceedings involving the reclassification of mail volume into changing product definitions.  Figure 10 on p. 35 of my initial report shows that, since 2007, 5 different products have been split into 13 products, including 5 instances in which mail volume previously classified as market dominant was moved to the competitive category.  A Shapley Value method that is instead based on units of the cost driver as opposed to products whose definitions are prone to change avoids the introduction of an additional complication into the Commission's analysis of any proposed changes in product definition, and simultaneously avoids any risk of creating an artificial incentive for the Postal Service to propose such changes.  Furthermore, an explicit acknowledgement that the unit of analysis is the unit of the cost driver allows for the mathematical simplification I described in my initial report[41] and avoids the computational difficulties usually associated with the Shapley method described by both me and Professor Bradley.[42]

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[40]   See generally, discussion in Neels, p. 26-28.  In particular, at p. 27, "units of the cost driver are used as the unit of analysis."  The title of Figure 8 also makes this clear.

[41]   Neels at p. 27.

[42]   Neels at pp. 26-27, Bradley at p. 27.

**Table R-1: Shapley Values Using Different Units of Analysis**

| Product | Units of Cost Driver | Product-Based Shapley Value | | Shapley Value Based on Cost Driver Units | |
|---|---|---|---|---|---|
| *Bradley Example* | | | | | |
| A | 70 | $ | 814 | $ | 614 |
| B | 150 | $ | 1,400 | $ | 1,316 |
| C | 300 | $ | 2,347 | $ | 2,631 |
| Total | 520 | $ | 4,561 | $ | 4,561 |
| *Adjusted Bradley Example* | | | | | |
| A | 70 | $ | 726 | $ | 614 |
| B | 150 | $ | 1,285 | $ | 1,316 |
| C1 | 100 | $ | 945 | $ | 877 |
| C2 | 200 | $ | 1,605 | $ | 1,754 |
| C Subtotal | 300 | $ | 2,550 | $ | 2,631 |
| Total | 520 | $ | 4,561 | $ | 4,561 |

## D.   CRITICISMS OF MY USE OF MCBRIDE'S INFRAMARGINAL COST CALCULATIONS

Professor Bradley criticizes McBride's methodology and claims that my use of that methodology to compute inframarginal costs for purposes of assessing the impact of Proposal One produces cost estimates that are overstated by $2.6 billion in FY14.[43]   Professor Bradley asserts that McBride's reclassification of the 'sum of cost pools' components as constant elasticity is the main driver of the difference in resulting inframarginal costs.

### 1.   McBride's Methodology for Calculating Inframarginal Costs

Since I based my initial estimates of the impacts of Proposal One on inframarginal costs computed using McBride's methodology, and since Professor Bradley has challenged the

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[43]   Bradley, pp. 35-37.

accuracy of that methodology, it is helpful to begin with a description of how Mr. McBride initially went about the task of computing these costs.

McBride's results[44] were based on Postal Service cost component classification assumptions established in R2006-1. McBride commented in his report on "the lack of a consistent approach as well as documentation" for how components are classified.[45]  In the course of his analysis he made a number of simplifying assumptions.   Specifically, in components which were piggybacked onto the sums of costs from several cost pools.  McBride adopted a simplified treatment, categorizing them as constant elasticity when a majority of the cost pools onto which they were piggybacked were classified as "constant elasticity."  McBride noted in making this assumption that his stated goal was simply to "calculate a relatively accurate estimate of system-wide inframarginal costs."[46]

McBride separated cost components into independent and dependent components, and split "Other" (or "institutional") costs into separate inframarginal and fixed cost subcomponents.  For independent components, McBride treated "Other" costs as inframarginal if the component was classified as constant elasticity, and as fixed if it was not.  For dependent components, he based the division between inframarginal and fixed costs on the ratio of inframarginal costs to fixed costs in the original "upstream" components.  Often when a dependent component is tied to the sum of one or more components, "Other" costs can be part inframarginal and part fixed for dependent components.

Using McBride's methodology, I calculated in my opening report that there were a total of $13.4 billion dollars of inframarginal costs in FY14 distributed among 48 of the cost components reported in the FY14 CRA Cost Model B.  To assess the potential product level impacts of Proposal One, I distributed these costs using each component's distribution keys.[47]

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[44]   McBride, Charles, "The Calculation of Postal Inframarginal Costs." ("McBride") Note that McBride calculates the magnitude of Inframarginal costs from 2007 to 2013 and I extend his methodology to 2014.

[45]   McBride, p. 8.

[46]   McBride, p. 7.

[47]   Neels, p. 30.

## 2.    Professor Bradley's Methodology for Calculating Inframarginal Costs

To evaluate Professor Bradley's criticisms I reviewed the supporting data and computer files he submitted along with his USPS-RM2016-2 report and that the Postal Service produced in response to CHIR No. 7.  These files include the Incremental Cost control tables, Input Cost Pool Data, and output files he used to produce his inframarginal cost calculation.  These files work with the analytical machinery contained in non-public library references submitted as part of the Postal Service's ACD filing that is used by the Postal Service to compute incremental costs for competitive products.  I compared Professor Bradley's categorizations and calculations with those contained in the FY2014 Competitive Product Incremental and Group Specific Costs filed by the Postal Service in ACD2014 (USPS-FY14-NP10).

The costing assumptions employed by Professor Bradley to compute the inframarginal costs for FY2014 presented in his report differ in a number of respects from the assumptions employed by the Postal Service in computing FY2014 inframarginal costs for competitive products.  CHIR No. 7 asked the Postal Service for an explanation of these discrepancies.

In its response to CHIR No. 7, the Postal Service explained that many of the differences between the assumptions underlying Professor Bradley's calculations and those underlying the calculation submitted in ACD2014 corrected errors in USPS-FY14-NP10.  For example, Cost Pools 1726 – LTR Product Specific Delivery Activities and 1727 – SPR Product Specific Delivery Activities were added as a correction "to conform to CRA methodology and should have been in USPS-FY14-NP10."[48]   These cost pools were included in FY15-NP10, but not in FY14-NP10.  Comments embedded in Professor Bradley's file relating to the another ten new Cost Pools appearing in his calculation indicate that these pools had been added to the inframarginal cost calculation on 10/16/15, prior to the December 2015 release of the 2015 ACR.[49]  It is not clear why these corrections did not appear in FY15-NP10, the file submitted by the Postal Service in its FY2015 ACD filings.

It appears that even the Postal Service has trouble getting the details of these calculations right.

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[48]    "Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7," Docket No. RM2016-2, March 2, 2016, response 2.a.i.

[49]    "Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7," Docket No. RM2016-2, March 2, 2016, ChIR.No7.Q3.IC14.cntl.xls.

In its response to CHIR No. 7, the Postal Service identified two further reasons for altering the component categorizations employed in the ACD2014 incremental cost calculation: (1) changes in methodology that were approved after ACR 2014 was released (component 126 – Retail Credit Card Fees)[50] and (2) the fact that they were "excluded by Dr. Neels" (components 202 – Annuitant Health Benefits – Earned (Current) and 531 – Workers' Compensation Current Year).[51]

I question the appropriateness of the decision to change the component 126 methodology. The Postal Service's treatment of this component was altered in response to a PRC Order that was released after the conclusions of the 2014 ACR.[52] The Postal Service's costing methodology is always in some sense a moving target. In my effort to calculate inframarginal costs for FY2014 I sought to employ the costing methodologies that were in effect at that time. I am unsure – and I suspect that the Commission might also be unsure – what to make of a calculation that mixes and matches costing procedures that were in effect at different points in time.

The exclusion of components 202 and 531 represents in my view a more egregious error. These calculations were clearly a part of the Postal Service's inframarginal cost calculation for FY14. I excluded these from my calculations only because I was following McBride's methodology and he excluded them. Although Professor Bradley explicitly *rejected* McBride's methodology for computing inframarginal costs, he saw fit to retain this portion of McBride's approach. Had Professor Bradley included these two components, his total inframarginal costs would have come to $11.83 billion, a figure that is only $1.58 billion less than my original calculation. This single decision accounts for $1.06 billion of the $2.64 billion difference between Professor Bradley's inframarginal cost calculation, and the calculation presented in my October report.

In general, Professor Bradley appears to be arguing that the most accurate way to calculate these costs is to follow the Postal Service's established incremental cost procedures. Given that choice

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[50] "Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7," Docket No. RM2016-2, March 2, 2016, response 2.a.ii.

[51] "Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7," Docket No. RM2016-2, March 2, 2016, responses 2.a.v, 2.a.vi.

[52] "Order Approving Analytical Principle Used in Periodic Reporting (Proposal Eleven)," Docket No. RM2015-4, February 9, 2015.

I see no valid reason to treat components 202 and 531 any differently from other components, or modify their categorization for purposes of this specific analysis.

## 3. Updates to My Calculation of the Impacts of Adopting Proposal One

I agree that McBride's simplifying adjustments produced inframarginal cost estimates that differ from those that would result from using the classifications and machinery reported by the Postal Service in the FY2014 Competitive Product Incremental and Group Specific Costs (USPS-FY14-NP10). Since one goal of the current docket is to provide a repeatable and valid procedure for calculating the cost effects of these proposals, I have updated my inframarginal cost calculations using the input files and VBA code provided in USPS-FY14-NP10. I also calculated, for all products, the impact of distributing those inframarginal costs.

Following the methodology laid out in USPS-FY14-NP10, Table R-2 lists the possible incremental cost classifications for each cost component.

**Table R-2: NP10 Cost Component Categorizations**

| Category | Name | Description |
|---|---|---|
| AC XXXX | Incremental = Accrued Cost | Incremental cost for class XXXX is set equal to total cost in VV cost matrix class 200. |
| VV | Incremental = VVC | Incremental cost is set equal to VVC. |
| CE | Constant Elasticity | Incremental cost is calculated with the constant elasticity formula. |
| PL | Sum Cost Pools | Cost pools within the component are treated differently. Component incremental costs reflect the sum of incremental costs across these cost pools. |
| PB XXXX | Dependent Calculation | Incremental cost is calculated as the ratio of incremental to volume variable for component XXXX, times the dependent component. |
| NA | | No category assigned. |

Source: USPS-FY14-NP10\ICForFiling\ICForFiling\FY14CPOnly\IC2014.cntl.xls

As in McBride's calculations, cost components can be either independent or dependent. The independent Accrued Cost (AC) and Volume Variable (VV) components have no inframarginal costs, while in the Constant Elasticity (CE) components, all "Other" or institutional costs are inframarginal. The Sum Cost Pools (PL) components are the components in which McBride adopted a simplified approach, treating the component as a Constant Elasticity component if a majority of its constituent subcomponents were classified as Constant Elasticity. In USPS-FY14-NP10, the inframarginal costs for these components are calculated as the sum of inframarginal

costs calculated for each of the cost pools. The Dependent (PB) components are treated in a manner similar to their treatment by McBride. Incremental costs in those components are calculated based on the ratio of incremental cost to volume variable cost in in their associated "upstream" components.

Using the information provided in the Postal Service's Responses to CHIR No. 7, I updated component categorizations and added cost pools as necessary to correct any errors and to assure that my calculations "conform to CRA methodology that should have been in USPS-FY14-NP10".[53] However, I did not incorporate into my calculations changes in a component's categorization or methodology that were implemented following the release of ACR2014. Nor did I ignore a component simply because McBride may not have calculated inframarginal costs for that component.[54] I used the corrected cost pool documentation provided in the Postal Service's response to CHIR No. 7.

Following this methodology, I calculate that there were $11.96 billion of inframarginal costs for all mail classes in FY14, compared to $13.41 billion following McBride's methodology. Table R-3 below shows the updated Proposal One cost impacts.

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[53] "Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7," Docket No. RM2016-2, March 2, 2016, response 2.a.i.

[54] I categorized Components 126 – Retail Credit Card Fees, 202 – Annuitant Health Benefits – Earned (Current), and 531 – Workers' Compensation Current Year as PB 0040, PB 0043, and PB 0043 respectively.

## Table R-3: Updated Proposal One Cost Impacts ($ Millions)

| Mail Class | 2014 Attributable Cost | Inframarginal Allocation | Proposal One | % of Current Costs |
|---|---|---|---|---|
| [1] | [2] | [3] | [4] | [5] |
| **Market Dominant Products** | | | | |
| Single-Piece Letters | 5,710 | 2,288 | 7,998 | 140% |
| Single-Piece Postcards | 266 | 102 | 369 | 138% |
| **Total Single-Piece Letters and Cards** | **5,977** | **2,390** | **8,367** | **140%** |
| Presort Letters | 4,560 | 1,750 | 6,310 | 138% |
| Presort Cards | 184 | 76 | 260 | 141% |
| **Total Presort Letters and Cards** | **4,744** | **1,825** | **6,570** | **138%** |
| Flats | 1,566 | 355 | 1,921 | 123% |
| Parcels | 543 | 135 | 677 | 125% |
| First-Class NSAs | 13 | - | 13 | 100% |
| Outbound Single-Piece First-Class Mail Int'l | 188 | - | 188 | 100% |
| Inbound Single-Piece First-Class Mail Int'l | 249 | - | 249 | 100% |
| **Total First-Class** | **13,280** | **4,705** | **17,986** | **135%** |
| High Density and Saturation Letters | 370 | 212 | 582 | 157% |
| High Density and Saturation Flats and Parcels | 881 | 401 | 1,282 | 145% |
| Every Door Direct Mail Retail | 39 | 31 | 70 | 178% |
| Carrier Route | 1,686 | 541 | 2,226 | 132% |
| Letters | 4,895 | 2,035 | 6,930 | 142% |
| Flats | 2,497 | 492 | 2,989 | 120% |
| Parcels | 103 | 19 | 122 | 119% |
| Standard Mail NSAs | 63 | - | 63 | 100% |
| **Total Standard Mail** | **10,534** | **3,731** | **14,265** | **135%** |
| In County | 86 | 28 | 113 | 132% |
| Outside County | 2,048 | 436 | 2,484 | 121% |
| **Total Periodicals** | **2,134** | **463** | **2,597** | **122%** |
| Alaska Bypass | 16 | - | 16 | 100% |
| Inbound Surface Parcel Post (at UPU Rates) | 13 | - | 13 | 100% |
| Bound Printed Matter Flats | 134 | 34 | 168 | 125% |
| Bound Printed Matter Parcels | 251 | 80 | 331 | 132% |
| Media and Library Mail | 328 | 77 | 406 | 124% |
| **Total Package Services** | **743** | **191** | **934** | **126%** |
| International Negotiated Service Agreements | 143 | - | 143 | 100% |
| Free Mail - blind, handicapped & servicemen | 40 | 8 | 47 | 120% |
| **Total Market Dominant Mail** | **26,874** | **9,099** | **35,972** | **134%** |
| **Total Market Dominant Services** | **1,331** | **546** | **1,877** | **141%** |
| **Total Market Dominant Mail and Services** | **28,205** | **9,645** | **37,850** | **134%** |
| **Competitive Products** | | | | |
| Total Priority Mail Express | 366 | 88 | 453 | 124% |
| Total First-Class Package Service | 1,155 | 286 | 1,441 | 125% |
| Total Ground | 2,472 | 780 | 3,252 | 132% |
| Total Priority Mail | 5,234 | 975 | 6,210 | 119% |
| Total Competitive International | 1,385 | 180 | 1,564 | 113% |
| Total Domestic Competitive Services | 359 | 2 | 360 | 100% |
| **Total Competitive Mail and Services** | **10,970** | **2,311** | **13,281** | **121%** |
| **TOTAL ATTRIBUTABLE COSTS** | **39,175** | **11,956** | **51,130** | **131%** |
| OTHER COSTS | 34,187 | (11,956) | 22,231 | **65%** |
| TOTAL COSTS | 73,362 | | 73,362 | **100%** |

Notes and Sources:

[1]: Mail classes reported in the FY14 Public Cost and Revenue Analysis (PCRA).

[2]: Attributable costs as reported in the FY14 PCRA.

[3]: Additional attributable costs from inframarginal costs calculated following the corrected FY14-NP10 Methodology. Inframarginal costs are attributed to mail classes in the CRA Cost Matrix B. The CRA Cost Matrix B mail classes are then matched (when possible) to mail classes reported in the PCRA. The mail classes and associated costs in the Cost Matrix B do not directly match what is reported in the PCRA. Thus the additional costs for both Proposals here are estimates. The inframarginal costs attributed to the "International Mail and Services" mail class in the CRA Cost Matrix B are split between Market Dominant and Competitive based on the ratio of "Total Competitive International" attributable costs reported in the PCRA to "International Mail and Services" attributable costs for Component 460 reported in CRA Cost Matrix B. The market dominant international costs are then distributed to Cost Matrix B mail classes according to their inframarginal Cost Allocations. The inframarginal costs attributed to the "U.S. Postal Service" mail class in the CRA Cost Matrix B have been distributed between CRA Cost Matrix B "Total Market Dominant" mail classes according to their inframarginal cost allocations.

[4]: [2] + [3].

[5]: [4] / [2].

# IV. Response to Comments on Proposal Two

The work on Proposal Two that was presented in my October report contained two elements. The first was an empirical attempt to assess whether costs that the Postal Service classifies as fixed are in fact fixed. The second tried to distill these findings down into a set of actionable recommendations. In responding to the various comments and criticisms that have been offered by various parties, it is important to distinguish between these two elements. The process of crafting actionable recommendations is admittedly complex. However, those complexities should not be allowed to obscure the striking nature of my basic findings.

## A.  WHAT THE PROPOSAL TWO RESULTS ARE TELLING US

I would like to focus first on what these results are telling us. In my original report I presented the results of a simple and straightforward test of the variability of Postal Service fixed costs. These results demonstrated a widespread, systematic and quantitatively and statistically significant tendency for Postal Service costing procedures to understate the volume variability of its costs. This tendency is widespread, affecting many cost components. It is highly significant statistically, even taking appropriately into account the higher thresholds required to achieve significance in the relatively small samples from which these results are derived.

## Table R-4: Description of Components with Positive and Statistically Significant Slope Coefficients in Fixed Cost Regressions

| Component Number [1] | Component Name [2] | Cost Segment [3] | Description [4] | Basis for Attributable Cost Determination [5] |
|---|---|---|---|---|
| 9 | Supervision of Admin. and Support Activities [\A\ report] | 2 | Includes costs for the supervision of administrative and support clerk activities involving personnel and time and attendance work | Dependent |
| 13 | Office | 2 | Office costs associated with supervision of city delivery carriers | Dependent |
| 17 | Street Other | 2 | Street other costs associated with supervision of city delivery carriers | Dependent |
| 18 | Network Travel | 2 | Network travel costs associated with supervision of city delivery carriers | Dependent |
| 33 | Product Specific and Other S & T | 2 | Product-specific training and supervision costs, all "other" supervision and training costs | 100% Fixed |
| 601 | Supervisor Training | 2 | Includes, for example: costs for managers, higher level supervisors, and technical personnel at CAG A J post offices, Stations and Branches, and Customer Service Districts | Dependent |
| 674 | Rural Delivery Carriers | 2 | Costs of supervision of collection and delivery for rural delivery carriers | Dependent |
| 41 | Other | 3 | Other costs associated with administrative clerks | Independent |
| 66 | Claims & Inquiry | 3 | Includes various costs incurred in customer service (handling complaints, processing dead letters for shipment or disposal, handling the contents of torn envelopes or broken packages, e.g.) | Independent |
| 228 | Time & Attendance [\A\ report] | 3 | Costs associated with time reporting and leave, including recording employee arrival and departure, distributing time cards, reviewing time cards for accuracy | Dependent |
| 422 | General Office & Clerical | 3 | Includes costs of receiving, routing, and responding to correspondence; performing receptionist functions; and various administrative costs | Dependent |
| 470 | Training | 3 | Includes costs of training activities, conducting or taking examinations, and quality improvement activities | Dependent |
| 43 | In-Office Direct Labor | 6 | Costs of sequencing residual mail and large parcels for delivery, "sweeping" secondary distribution cases, "strapping out" mail from the vertical case into bundles, "markups," and "holds," as well as various administrative activities | Independent |
| 44 | In-Office Support Overhead | 6 | Include moving empty equipment, personal time, checking vehicles, loading vehicle, and training. Cannot be assigned to a route type | Dependent |
| 53 | Network Travel Support | 7 | Network travel support costs for city carrier delivery | Dependent |
| 70 | Other Routes | 10 | Two types of "other" routes: "A" routes- relieve overburdened routes or accommodate route expansion that cannot be handled by adding segments to existing routes. "M" routes- existing routes for which the mileage-based compensation rate exceeds the evaluation schedule compensation rate | Independent |
| 86 | City Delivery Network Travel | 12 | Motor vehicle service personnel city delivery network travel costs for street delivery | Dependent |
| 89 | Other Personnel | 12 | Repair of vehicles used for administrative duties | 100% Fixed |
| 100 | City Delivery Office | 12 | City delivery office costs related to vehicle hire for city street delivery | Dependent |
| 114 | Other Local Operations | 13 | Personnel costs for Purchasing Field Service Centers (responsibilities include maintenance contracting, food service, and supply management) and Facilities Field Offices (facility planning, engineering specifications) | 100% Fixed |
| 125 | Fed. Reserve & Commercial Bank Services | 13 | Consists of charges by the Federal Reserve for processing the redemption of Postal Service bonds or Commercial banks for maintaining bank accounts for USPS. Retail credit card fees are paid by USPS for processing credit and debit transactions | 100% Fixed |
| 127 | City Delivery Office | 13 | City delivery office costs, miscellaneous local operations | Dependent |
| 131 | City Delivery Network Travel | 13 | City delivery network travel costs, miscellaneous local operations | Dependent |
| 134 | Other Carfare | 13 | Carfare represents costs of reimbursement for employees' use of public transportation while serving their routes. | 100% Fixed |
| 136 | City Delivery Office | 13 | City delivery office costs related to city delivery driveout | Dependent |
| 140 | City Delivery Network Travel | 13 | City delivery network travel costs related to city delivery driveout | Dependent |
| 168 | Communications | 15 | Expenses include telephone and telegraphic services, Postal Service equipment and operations moving expenses, and noncapitalized facility improvements | 100% Fixed |
| 169 | Building Projects Expense | 15 | Space-related building occupancy expenses related to building projects | 100% Fixed |
| 175 | Repair Equip. Supplies & Services Excl. ADP | 16 | Includes costs of spare parts and materials and contractor services used for the maintenance and repair of mail processing equipment | 100% Fixed |
| 179 | Printing & Reproduction | 16 | Costs related to printing, reproduction, and graphics | 100% Fixed |
| 246 | Advertising | 16 | Cost of advertising to provide public information, promote the Postal Service, and encourage mailers to perform activities to improve postal efficiency | 100% Fixed |
| 193 | Area Administration | 18 | Personnel costs within area administration | 100% Fixed |
| 195 | Inspection Service Field Support | 18 | Cost of postal service inspection personnel, which provide protection for Headquarters/field offices and are responsible for internal audits/special investigations | 100% Fixed |
| 202 | Annuitant Health Benefits - Earned (Current) | 18 | Payment owed for Postal Retirees Health Benefit Fund and payments for health benefits for current retirees | Dependent |
| 219 | Maintenance Technical Support Center | 19 | The MTSC provides technical support to postal facility maintenance personnel and establishes maintenance standards for new types of postal equipment | 100% Fixed |
| 225 | City Delivery Network Travel | 20 | Motor Vehicle depreciation costs related to Network Travel for City Carrier vehicles | Dependent |
| 1437 | Other Interest | 20 | Interest costs incurred mainly as a result of borrowing money not included elsewhere | 100% Fixed |

Sources and Notes:

[1] - [3]: From USPS Public B Report, FY 2014.

Table R-4 shows a brief description of the components in which I found hidden variable costs. One fact that immediately becomes clear as one peruses these descriptions is that many of these costs could broadly be described as overhead costs – that is, costs incurred in support of other activities that are more directly related to mail handling and delivery. In the cost descriptions, words such as "office," "administration," "supervision," "space," and "maintenance" occur with some frequency.

In virtually all organizations one can find a set of administrative, or "overhead" activities – human resources, space costs, finance, general management and the like – that support other direct activities, and whose costs depend on the overall size of the organization. As an organization grows, such overhead costs also tend to grow. Similarly, when an organization shrinks, such costs also tend to decline.

Professor Bradley seems to suggest that overhead costs of this nature cannot be attributed in any way to individual products:

> Common costs are those costs that arise from the use of the common input in a multiproduct firm, and that input can be variable or fixed. This means that common costs can be variable or fixed. The key characteristic of common costs is that they are not individually caused by any of the firm's products and are not causally related to variations in the levels of those products' individual volumes.[55]

If that is in fact what he is saying, I disagree. It is the production of individual products that gives rise to the many different operations supported by overhead activities. The rate at which overhead costs increase is generally related to increases in the overall size of a firm, and one can readily measure the contribution that additional output of products makes to increases in the size

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[55] Bradley, pages 6-7.

of a firm. Measuring such relationships requires data, effort and care. Conceptually, however, I see no reason to distinguish these patterns of cost causation from those observed in mail processing, highway transportation, or other more "direct" activities. I do not find it at all surprising that my statistical analysis indicates that the cost of these overhead or support activities tends to increase and decrease as mail volumes rise and fall.

I have noted that there is sometimes a tendency in organizations to regard overhead costs as fixed. Actual experience, however, rarely confirms this prejudice. As its business has declined the Postal Service has downsized many aspects of its operations. Most private organizations faced with similar declines do the same. And growing businesses often find themselves adding to their HR, accounting and supervisory staffs in order to accommodate growing workloads.

Table R-4 also shows the basis in current Postal Service costing procedures for cost attribution in these components. Many of the components in which I find hidden variable costs are currently treated as entirely fixed. In these components no variable costs are attributed to products.[56] Most of the remaining components are "Dependent," which means that the split between institutional and attributable costs in these components is based upon an assumption that this split is the same as in some other component that is modeled separately. It is only in the components labeled as "Independent" that the split between institutional and attributable costs is based upon actual independent data and analysis. Remarkably, only 4 of the 37 components in which I found hidden variable costs are classified as independent. In the remaining 33, current costing procedures simply assume that there are no variable costs in the component, or else that the split between fixed and variable costs mirrors a split computed elsewhere for a different set of costs.

My conclusions regarding hidden variable costs have been criticized because they are based on limited data and a simplistic analysis. In weighing these criticisms the Commission should keep in mind the fact that in 33 of the 37 components where I found hidden variable costs current costing procedures seem largely to be based on *no data* and *no analysis* – just a set of assumptions.

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[56]  Note that some of these components have international or product specific attributable costs. However, none of these costs are included in the dependent variables for my regression analysis.

### 1. The Econometric Results upon Which Proposal Two Rests Are Highly Robust

In weighing these results the Commission should also remain mindful of their extraordinary robustness. If my results were truly as fragile and unreliable as my critics charge, I would expect them to be all over the map, with fixed costs sometimes rising in response to growth in volume and sometimes declining. But, that is not what I find. Instead I find a clear tendency in component after component for "fixed" costs to move in tandem with changes in volume.

If these results were truly fragile and unreliable I would expect them to be highly sensitive to slight changes in the inputs used in that analysis. But again, that is not what I find. As I explained in my initial report, I tested the sensitivity of my results to several different methods of adjusting for inflation.[57] These included the substitution of a simple measure of labor costs per hour for the Fisher Index of occupation specific wages, the use of inflation indexes that ignored non-labor inputs and account only for changes in labor costs, and two general measures of inflation – the Consumer Price Index, and the GDP Deflator. All of these tests yielded qualitatively similar results.

In response to criticisms by Professor Bradley of the weighted volume measures used in my analysis, I conducted a further set of robustness tests based on alternative measures of volume -- specifically, straight piece counts and the physical weight (in pounds) of all the mail moved by the Postal Service in a given year. At the aggregate level, both alternative measures give results that are very similar to those I presented in Table 8 in my initial report; both show a positive and statistically significant relationship between cost and volume, and both have comparable $R^2$ measures and t-statistics with those presented in Table 8. Furthermore, in both of these alternative analyses the implied estimate of hidden variable costs is *higher* than those implied by the results in Table 8 and Figure 11. The component-level fixed cost regressions with these alternative volume measures are also very qualitatively similar to my main results, in that

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[57] Neels, FN48, p. 34. These results were also included in RM2016-2-UPS-NP1. As I will explain below, these robustness checks have addressed the concern voiced by Dr. Thompson (¶ 20, 29) related to changes in input prices.

running the 84 regressions with the alternate measures yields 65 and 61 positive coefficients, of which 38 and 31, respectively, are statistically significant.[58]

Finally, I also obtain qualitatively similar results when I estimate similar fixed cost regressions at the segment level. Of the 15 segments for which I am able to run the regression, I obtain a positive coefficient 11 times, of which 4 coefficients are statistically significant, a similar proportion to the component-level results. The implied hidden variable costs are again economically significant.

## 2. The Sample Sizes for the Proposal Two Regression Analyses Are Adequate

Some of the criticisms of my hidden variable cost analysis assert that no analysis based on a sample of just eight observations can possibly be reliable. I believe that these criticisms stem in part from a degree of prejudice on the subject of sample size. We live in a much more data rich and heavily digitized environment than we once did, and econometricians have become accustomed to the ready availability of large data sets. While researchers today benefit from the availability of large data sets, in many settings they employ techniques that were developed for estimation and inference based on much smaller sample sizes. Statistical analysis based on the application of simple techniques to datasets that by today's standards are extremely small has often been used in seminal economic research. One particularly salient example is provided by the Nobel Laureate Lawrence Klein, whose Interwar model estimated 11 parameters in a system of three equations using just 21 annual observations.[59]

Tables of critical values for the $t$ statistic – the workhorse statistical test used in most regression analysis – routinely report such values all the way down to one degree of freedom (what one would be left with after running a univariate regression on a three data point sample). Table R-5 presents such an example drawn from a statistics text published in 2015. Obviously, in a small sample a stronger statistical signal is needed in order to draw firm conclusions, but the available statistical procedures provide accurate guidance on exactly how strong that signal has to be. My

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[58]   Additional comments regarding Professor Bradley's criticism of my preferred independent variable are in following sections of my report.

[59]   Klein, LR. Economic Fluctuations in the United States 1921-1941. Cowles Commission Monograph. Vol. 11. 1950, New York: John Wiley & Sons, Inc.

conclusions about statistical significance account appropriately for the samples sizes upon which they are based.

**Table R-5: Sample Table of Critical Values from the *t* Distribution**
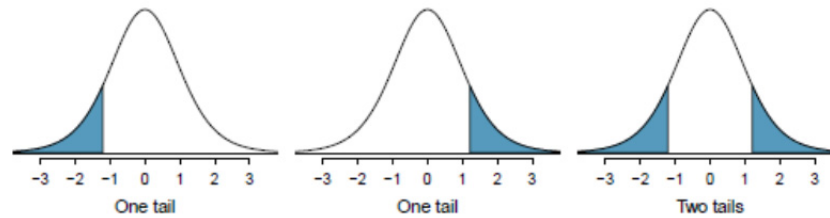
## B.2  t-Probability Table



Figure B.1: Tails for the *t*-distribution.

| one tail | 0.100 | 0.050 | 0.025 | 0.010 | 0.005 |
|---|---|---|---|---|---|
| two tails | 0.200 | 0.100 | 0.050 | 0.020 | 0.010 |
| df  1 | 3.08 | 6.31 | 12.71 | 31.82 | 63.66 |
| 2 | 1.89 | 2.92 | 4.30 | 6.96 | 9.92 |
| 3 | 1.64 | 2.35 | 3.18 | 4.54 | 5.84 |
| 4 | 1.53 | 2.13 | 2.78 | 3.75 | 4.60 |
| 5 | 1.48 | 2.02 | 2.57 | 3.36 | 4.03 |
| 6 | 1.44 | 1.94 | 2.45 | 3.14 | 3.71 |
| 7 | 1.41 | 1.89 | 2.36 | 3.00 | 3.50 |
| 8 | 1.40 | 1.86 | 2.31 | 2.90 | 3.36 |
| 9 | 1.38 | 1.83 | 2.26 | 2.82 | 3.25 |
| 10 | 1.37 | 1.81 | 2.23 | 2.76 | 3.17 |
| 11 | 1.36 | 1.80 | 2.20 | 2.72 | 3.11 |
| 12 | 1.36 | 1.78 | 2.18 | 2.68 | 3.05 |
| 13 | 1.35 | 1.77 | 2.16 | 2.65 | 3.01 |
| 14 | 1.35 | 1.76 | 2.14 | 2.62 | 2.98 |
| 15 | 1.34 | 1.75 | 2.13 | 2.60 | 2.95 |
| 16 | 1.34 | 1.75 | 2.12 | 2.58 | 2.92 |
| 17 | 1.33 | 1.74 | 2.11 | 2.57 | 2.90 |
| 18 | 1.33 | 1.73 | 2.10 | 2.55 | 2.88 |
| 19 | 1.33 | 1.73 | 2.09 | 2.54 | 2.86 |
| 20 | 1.33 | 1.72 | 2.09 | 2.53 | 2.85 |
| 21 | 1.32 | 1.72 | 2.08 | 2.52 | 2.83 |
| 22 | 1.32 | 1.72 | 2.07 | 2.51 | 2.82 |
| 23 | 1.32 | 1.71 | 2.07 | 2.50 | 2.81 |
| 24 | 1.32 | 1.71 | 2.06 | 2.49 | 2.80 |
| 25 | 1.32 | 1.71 | 2.06 | 2.49 | 2.79 |
| 26 | 1.31 | 1.71 | 2.06 | 2.48 | 2.78 |
| 27 | 1.31 | 1.70 | 2.05 | 2.47 | 2.77 |
| 28 | 1.31 | 1.70 | 2.05 | 2.47 | 2.76 |
| 29 | 1.31 | 1.70 | 2.05 | 2.46 | 2.76 |
| 30 | 1.31 | 1.70 | 2.04 | 2.46 | 2.75 |

Source: Diaz, David M., Christopher D. Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics, Third Edition*. 2015. Page 430. Available at https://www.openintro.org/stat/textbook.php?stat_book=os. Only the first page of the table is reproduced here. The second page of the table provides additional rows corresponding to additional degrees of freedom, with all critical values decreasing as the number of degrees of freedom increases.

Nonetheless, I appreciate the fact that more data are always better than less, and I explored a number of possibilities for expanding the available sample. One possibility might have been to explore the use of quarterly data. I believe, however, that while a switch from annual to quarterly observations would have added data points, it would have added little useful additional information. Mail volumes show a strong seasonal variation, while overhead costs will tend to adjust relatively slowly. Knowledge of and the need to accommodate an upcoming end of year peak in mail volumes would be expected to influence network characteristics, operating practices and staffing levels even during lower volume periods earlier in the year. I would expect a data set in which much of the volume variation is associated with seasonal shifts to yield markedly different results from those based on longer term shifts in mail volumes, and generally to be less relevant to the questions I sought to address.

Another alternative would have been to attempt to extend the sample backward in time. There were problems with this approach as well. Extending the sample backward would have meant drawing in data from the pre PAEA era, when the Postal Service operated under a markedly different regulatory regime. In addition, following the passage of PAEA there were some significant changes in some of the Postal Service's public cost and volume reports that made it difficult to assemble a consistent time series.

While my analysis is necessarily limited by the amount of data available to me, that fact does not mean that the relatively simple question I have posed – whether costs that are reported as fixed vary with volume – cannot be reliably answered with those data. Regardless of whether the Commission accepts the specific recommendations below, it should take these findings seriously as it makes other decisions and rules on other matters.

## B. REPLY COMMENTS OFFER FEW SPECIFIC CRITICISMS

While the reply comments filed by Professor Bradley, Dr. Thompson and Mr. Glick energetically question the reliability of the Proposal Two regression analyses, the criticisms they offer and the questions they raise are frequently only generalized and nonspecific. I address them below by topic, rather than by author.

## 1. Criticism Alleging Omitted Variable Bias

Professor Bradley and Dr. Thompson have suggested that the econometric analyses I have performed are flawed because they omit important variables.[60] It is easy to accuse any econometric exercise of failing to account for important but nonspecific variables bias and impossible ultimately to refute such charges. In order for such criticisms to be taken seriously, the critic must offer some specific suggestions regarding just what it is that he thinks might have been omitted.

In this context, the authors of the reply comments do cite a handful of general factors that they suggest might be able to account the results produced by the Proposal Two regression analyses. Dr. Thompson focuses on changes in input prices as a potential omitted variable that could influence the reported level of fixed costs.[61] Professor Bradley also explicitly mentions changes in labor contracts as a factor "that could affect these costs over an eight-year period."[62] Professor Bradley and Dr. Thompson speculate about a variety of other factors that "could" or "may" affect fixed costs, including "changes in technology, regulatory shifts, management adjustments," "changes in relative input prices, advances in postal technology, or other non-volume factors", or "investment expenses, accounting accruals, or regulatory costs."[63]

The concerns expressed by Professor Bradley and Dr. Thompson about the potential effects on my findings of failure to account for changes in input prices are groundless. I did, in fact, adjust explicitly for changes in input prices, as I explained in my initial report.[64] In addition, as discussed above, I also ran a series of robustness checks based on alternative ways of accounting for changes in input costs. Results of these alternative analyses confirmed that the results from the Proposal Two regression analysis are not sensitive to how one adjusts for changes in input prices.[65] In one of these tests I adjusted reported costs for input price changes using a simple

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[60] See, e.g. Bradley, pp. 43, 45 ; Thompson ¶ 28.

[61] See Thompson ¶ 29-30.

[62] See Bradley, p. 45.

[63] See Bradley, p. 45 and Thompson, ¶ 20 and ¶ 29.

[64] See Neels, pp. 33-34.

[65] See Neels, pp. 33-34, including FN 48.

measure of labor cost per hour,[66] a measure that already addresses directly the concerns expressed by Dr. Thompson.[67]

Other possible omitted variables cited by Professor Bradley and Dr. Thompson are so general that it is difficult to discuss them in a substantive way. Changes in technology occur all the time. I would expect the effects of such changes to vary from component to component, depending upon the nature of the activities they cover. Instead I find a broad tendency across many different components for fixed costs to decline with declines in volume. The nature of the "regulatory shifts" that are referred to is unclear, since all of the data used in the Proposal Two regression analyses are drawn from the post PAEA era. "Management adjustments" could be referring to reductions in management costs or headcount, and could thus be a different name for the same effect I sought to measure in my regression analysis – namely, volume related reductions in cost -- rather than an alternative explanation for it. Dr. Thompson argues that the Postal Service was profoundly affected by the recession that followed the financial crisis.[68] He is undoubtedly correct in this assertion. However, it seems fairly clear that the significant effect that recession had on the Postal Service was the effect it had on mail volumes – precisely the effect accounted for in my analysis. It is hard to know in any detail what other possible omitted variables critics may be referring to.

Mr. Glick specifically identifies three cost components where he believes that non-volume factors have affected the reported fixed costs. The first such component is component 169 – Building Projects Expense.[69] Here, he cites Postal Service documents explaining that cash constraints caused the Postal Service to slash or defer building maintenance expenditures and related capital expenditure over the timeframe of my analysis. Mr. Glick believes that "this deferral of facility spending…has reduced the magnitude of costs reportedly incurred" in

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[66] I note that over the 2007-2014 period labor costs made up 76-78% of overall Postal Service costs. I have excluded retiree health benefit prefunding (though not current premiums) from these figures.

[67] In particular, Dr. Thompson opines that "if input factor prices changed in real (inflation-adjusted) terms during that period, overhead costs depending on those input prices would likely have changed independently of mail volume" (¶ 29). However, my main results control for changes in input prices and not general measures of inflation. I only used general measures of inflation in some of my robustness tests.

[68] Thompson, pp. 12-13.

[69] Glick, pp.4-6.

component 169 and other components.[70]  While this statement may be true, I disagree with the implications he seeks to draw.  In my experience, when organizations going through lean times or times of transition say that they are "deferring costs" they are often simply cutting costs.  It is often difficult to find evidence that these supposedly "deferred costs" actually reappear on the budget one, two, or more years later, as their characterization as "deferrals" would suggest.  Rather, the decision to reduce those costs in a given year typically reflects a recognition that some of the costs that the organization could afford to incur when volumes and revenues are high are not sustainable when they are not.[71]  I believe we need to see evidence of actual recurrence before accepting Mr. Glick's characterization of these costs as "deferred."

Mr. Glick does provide evidence related to two factors that my initial analysis did not consider, but that do have an impact on my results.  First, with respect to Component 202 "Annuitant Health Benefits and Earned CSRS Pensions (Current)", Mr. Glick has pointed out that a portion of the costs (roughly 17% in FY2014) in this component are tied to CSRS pensions, a program which covered a decreasing share of Postal Service employees in FY2007-FY2014.  To determine how this shift away from reliance on CSRS pensions may have affected my results, I estimated a modified version of my Component 202 regression, after removing fixed costs associated with CSRS pensions.  While the resulting estimates implied a smaller quantity of hidden variable costs in this component than my original analysis, I continue to find a positive and significant relationship to volume in the remaining Component 202 fixed costs.[72]

The final component that Mr. Glick discusses is Component 70 (Rural Carriers – Other Routes).[73]  Here he argues that part of the movement in costs is driven by a decrease in the share of rural delivery costs that fall into this component, while the share in a related Component 69 - Evaluated Routes increased.  Dr. Thompson subsequently estimated a variant of my fixed cost

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[70]  Glick, p. 5.

[71]  Indeed, the sustained downward trend in this component as demonstrated by both the statements cited in Mr. Glick's report and his Figure 1 suggest that these deferrals are not a temporary blip but part of a new, lower-cost reality for the Postal Service.

[72]  In the same section of his report, Mr. Glick also discusses Component 203 - Annuitant Health Benefits - Pre-Funded (Prior).  Glick, pp. 10-11.  While I estimated a regression for Component 203, it did not factor into my recommendations for Proposal Two.  The fixed costs associated with Component 203 were also excluded from my aggregate fixed cost regression.

[73]  Glick, pp. 12-14.

regression after combining these two components and in doing so failed to find evidence of hidden variable costs.[74]  I find this approach to be reasonable, and incorporate it into the updated recommendations that I will discuss in the next section of my report.

Mr. Glick speculates that it would be possible to find similar alternative explanations for the relationships between fixed costs and volume captured by my analysis.[75]  However, he offers no evidence to support this speculation.

I have considered carefully the comments offered by critics regarding potential omitted variables. Omitted variable bias is always a potential concern in a regression analysis.  However, for the reasons outlined above I don't believe that the list of potential omitted variables offered by critics offer a plausible alternative explanation for my results.  Despite offering numerous speculations about possible confounding factors, commenters have cited precisely one component, out of 37 components for which I found a positive and significant relationship between weighted volume and fixed cost, in which an alternative econometric approach yields results counter to my component-level regressions.[76]

## 2.    Criticisms Alleging Measurement Error

Professor Bradley also asserts that the measure of weighted volume that I construct for use as an independent variable in the fixed cost regressions is imperfect because it fails to account properly for product heterogeneity over time caused in part by changes in product definitions over time.[77] This critique is essentially a restatement of the challenge illustrated by Figure 10 in my initial report.  While it may be true that changes in product definitions that both he and I have pointed out have taken place have altered to some degree the meaning of the published volume count data[78] there is no evidence that any such measurement error is material, that it introduces a systematic bias, or that correcting it would alter the results of my analysis.  The results I presented in my report are based on the most plausible and simple measure possible of work content.  In the absence of evidence that the measure I use is biased in any meaningful way, the

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[74]    Thompson, ¶ 31.

[75]    Glick, p. 4.

[76]    See Thompson, ¶ 31.

[77]    See Bradley, pp. 43-45.

[78]    See Neels, pp. 34-35, including Figure 10; Bradley, p. 44.

statistical significance of the results attests to the appropriateness of the weighted volume measures used.

However, as discussed above I tested the robustness of my results using two alternate (and even simpler) measures of volume – the number of mail pieces delivered by the Postal Service in a given fiscal year, and the physical weight of those pieces -- that are unaffected by mail reclassifications. Both the aggregate regression and the component-level regressions yield results that are qualitatively very similar to my primary results, without meaningful loss of statistical significance. These results indicate that Professor Bradley's concerns over measurement error in my weighted volume variables are groundless.

### 3.    Criticisms Alleging Insufficient Sample Size

Commenters have asserted that eight observations are too few to estimate the relationship between fixed costs and weighted volume, whether at the aggregate or component level, and regardless of the statistical significance of the estimated coefficients.[79] Although I have addressed these general criticisms above, I will respond here to some of the more technical points critics have raised.

Professor Bradley has expressed concern that a regression based upon so few points suffers from low statistical power.[80] This expression of concern appears to reflect a misunderstanding of the concept of statistical power, which refers to the probability that the test correctly rejects the null hypothesis when the alternative hypothesis is true. In other words, low statistical power increases the risk of Type II (false negative) error, which in this case would mean failing to reject the null hypothesis that reported fixed costs unrelated to weighted volume when they in in fact are related.[81] Since the hypothesis test, based on the aggregate fixed cost regression, rejects the null hypothesis (as do 37 of the 84 component-level regressions), Professor Bradley's concern is misplaced. To the extent that my analyses do suffer from low statistical power, this fact would imply that fixed costs actually vary with changes in weighted volume in *more* than 37 out of 84 components.

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[79]    See Bradley, p. 45; Thompson, ¶ 38.

[80]    See Bradley, p. 45.

[81]    Irwin Miller and Marylees Miller, John E. Freund's Mathematical Statistics with Applications, Seventh Edition (Upper Saddle River: Pearson, 2004), 380.

Dr. Thompson has also pointed out that statistical inference based on the small sample size imposes the additional assumption that the residuals from the distribution are normally distributed, and that the calculations of statistical significance are based on an assumption that the residuals from the regression equation are independent and identically distributed. He speculates that these assumptions may be violated, and that the results are therefore unreliable. However, he has not proposed any tests of these assumptions, or investigated whether a different set of assumptions would fundamentally alter my results. I have conducted additional robustness checks and found that these concerns do not materially affect my results.

Specifically, I have tested the normality of the residuals and found that of the 84 component fixed-cost regressions, the null of normality can be rejected at the 5% level only 4 times, which is almost exactly the rejection rate one would expect under the design of the test if in fact the residuals were all normally distributed.[82] Furthermore, in none of the 37 components for which I find a positive and statistically significant relationship between inflation-adjusted fixed cost and weighted volume can the null of normality be rejected.

I have also estimated, for each of my 84 component regressions, standard errors that account for both heteroskedasticity and auto-correlation in the residuals.[83] Using this test, I still find overwhelming support for the finding that the Postal Service's fixed costs are related to weighted volume. In fact, these results are somewhat stronger than those presented in my opening report, as they yield positive and statistically significant slope coefficients in 40 of 84 regressions.

In short, Dr. Thompson has speculated that assumptions implicit in my statistical analysis have rendered it unreliable, without providing any evidence that those assumptions are unreasonable in the current context. I have conducted robustness checks using the best available statistical methods to test those assumptions and have reaffirmed the validity of my results.

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[82]  I use a test for normality designed by Royston (1991). This is a variant of the more common Jarque-Bera test which is calculated from the sample skewness and kurtosis, but with an adjustment to accommodate small sample size. See Patrick Royston "Comment on sg3.4 and an Improved D'Agostino Test." Stata Technical Bulletin 3: 23–24 (1991). College Station, TX: Stata Press.

[83]  I do this using Newey-West standard errors. See Newey, Whitney K; West, Kenneth D (1987). "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix". Econometrica 55 (3): 703–708.

## C.   PROFESSOR BRADLEY'S ROBUSTNESS TESTS ARE CONTRIVED AND UNRELIABLE

In addition to the critiques discussed above, Professor Bradley presents the results of several analyses intended to test the robustness of my results.  However, these additional analyses are either slight variations on the critiques I have already addressed, and/or they reflect a meaningful misunderstanding or mischaracterization of the econometric analysis I have performed.  I discuss each of these in turn.

In Table 6, Professor Bradley presents the results of two alternative regressions which pertain to the omitted variables critique discussed above.  Here, he re-estimates the aggregate model I presented in my initial report, using first the weighted volume associated with market dominant products, and second, the weighted volume associated with competitive products.  There is no conceptual justification for either of these models, since both omit known, important and readily measurable drivers of cost.[84]  This "robustness check" is in fact a deliberate mis-specification of the model, and should be ignored.

Next, turning to the component-level regressions, Professor Bradley estimates an augmented version of my aggregate cost model to which he adds a linear and a quadratic time trend.[85]  The weighted volume measures I use are highly correlated with Professor Bradley's time trends.  The models that result from their inclusion suffer from severe multicollinearity and overfit the data.  In general, there is no conceptual justification for including a time trend in a model, except to serve as a proxy for some otherwise omitted variable that is correlated with the time trend.  Given the high correlation that exists between his time trend measures and weighted volume, it is hard to see what other omitted variable they might proxy for, or what valid reason there might be for adding them to the regressions.

Professor Bradley's subsequent discussion of these results reveals a further flaw in his understanding of the exercise of finding hidden variable costs.  In particular, in evaluating the results of his over-specified component-level regressions, he posits that in order for there to be

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[84]   This introduced bias could alternatively be considered omitted variable bias in that each regression omits one of two key measures of volume, or bias related to measurement error in that Professor Bradley has knowingly used a weighted volume measure that is an incomplete measure of the size of the Postal Service.

[85]   Bradley, pp. 51-54.

hidden variable costs, the slope must not only be positive and significant, but that the constant must also fail to differ statistically from 0. This assertion reflects either a mischaracterization or a misunderstanding of my approach. As is clear from Tables 12-14 of my report, I allow for the possibility that some portion of those components which contain hidden variable costs also contain costs that are truly fixed. The analysis by Professor Bradley at pp. 51-54 of his report sheds no useful light on any of the real issues before the Commission.[86]

Professor Bradley also makes much of a misstatement in my report.[87] My recommendation with respect to the components in Table 12 is to attribute "hidden" variable costs to individual products based on their respective shares of overall attributable costs in the *same* fiscal year, and not as I wrote, in the _preceding_ year. The Proposal Two cost impacts presented in Table 15 are actually calculated using the same-year shares and not the previous year's shares. This is clear from the worksheets supplied in RM2016-2-UPS-NP1, but I appreciate the chance to clarify this issue here.

Dr. Bradley presents in Table 8 a series of variabilities associated with ten components for which I ran fixed cost regressions. For 8 of the 10 components, the implied variability from the base regression model (with constant) exceeds 100%, an indication that the component exhibits diseconomies of scale. Variabilities in excess of 100% imply negative fixed costs, a result that I found to be implausible a priori, and that led me to re-estimate, for those components, a regression model through the origin (*i.e.*, without a constant).[88]

Professor Bradley attempts to argue that the observations associated with 2007 and 2008 are outliers, and he presents alternative regression results based upon samples that omit these data points. His only basis for characterizing these observations as outliers seems to be that fact that mail volumes were much higher in those years than in later years. There is no justification for

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[86]  Furthermore, Table 7, in which Professor Bradley identifies the components that meet his conditions that ALL of the purportedly fixed costs in a component are in fact variable, is inconsistent with the results contained in library reference RM2016-2-USPS-NP1. In particular, Component 73 does not satisfy the conditions he lays out.

[87]  Bradley, pp. 39, 55.

[88]  Although Professor Bradley criticized first stage regression results that implied variabilities in excess of 100 percent, he and Dr. Thompson also criticized me for addressing this problem and rerunning the affected regression models with a different specification. See Bradley, p. 52; Thompson at ¶ 56-57.

eliminating observations as outliers simply because they have high volumes. To characterize observations as outliers one needs some reason to believe that they are drawn from a different population than the remainder of the sample. Professor Bradley has provided no such rationale or justification.[89] Professor Bradley's truncated sample removes much of the variation in the independent dependent variables, resulting in a substantial loss of statistical power. It is unsurprising that a systematic removal of high-volume observations changes the results. But as Professor Bradley surely knows, the mere fact that an observation differs from others in the dataset does not constitute a rationale for removing it and thus creating a biased sample.[90] Accordingly, the results he presents in his Table 4 and Table 5 are biased and should be ignored.

## D. How Should The PRC respond to the evidence that the Postal Service is systematically understating the variability of its costs?

I would argue that the statistical analyses underlying UPS Proposal Two provide compelling evidence of a systematic tendency for Postal Service costing procedures to understate the volume variability of that organization's costs. That being said, I recognize the complexity of the factors that the Commission must consider as it decides what to do with these findings. As the Commission weighs its decision, I would urge it to consider the following facts.

First, many of the components in which my analysis identifies hidden variable costs cover supervisory activities or other support activities. It is highly reasonable to expect that the cost of overhead and support activities will tend to vary to some degree with variations in the size of the activities that they oversee and support. The approach that I have adopted here is very well suited to measuring the extent of any such variation. And according to standard statistical tests, it is able to do so with a high degree of precision.

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[89] Professor Bradley states only that "the Great Recession years…were tumultuous for the Postal Service" (p. 45) and that FY2007 and possibly FY2008 were "atypical" (p. 46). Dr. Thompson makes similar reference to the Great Recession's potential effects on fixed costs, without attempting to quantify them and choosing to ignore the adjustments I made for changing input prices and the robustness of these results. (¶ 29-30, 44)

[90] See, for example, Miller and Miller, p. 227: "Outlying observations may result from several causes …There is always a great temptation to drop outliers from a data set entirely on the basis that they do not seem to belong to the main body of data. But an outlier can be as informative about the process from which the data were taken as the remainder of the data. Outliers which occur infrequently…give evidence that should not be ignored…they should be discarded only after a good reason for their existence has been found."

A second factor for the Commission to consider is that in many components in which I have identified hidden variable costs there is little or no empirical evidence to support the currently used assumptions regarding the volume variability of these components. My analysis identified approximately $3.4B in hidden variable costs, covering 37 distinct components. Fourteen of those components, comprising $1.1B in hidden costs are currently regarded as entirely fixed. Nineteen additional components, comprising $1.9B in hidden variable costs, are currently divided between fixed and variable costs based upon an *assumption* that these components have the same volume variabilities as other components on which they are assumed to "depend." Thus, in many cases the current splits between fixed and variable costs rest upon mere assumptions – assumptions that may appear reasonable on their faces, but which do not rest upon any genuine empirical analysis. In contrast, my own conclusions are based upon observation and analysis of actual cost changes.

It is only in a relatively small number of components (4, consisting of $400M in hidden variable costs) that I find hidden variable costs in an independent component in which there is some sort of incumbent cost model that arrives at a contradictory conclusion. It is only in these cases that the Commission confronts a genuine decision as to which of two empirical analyses is more credible.[91]

In an effort to simplify the issue before the Commission, I would urge them to adopt my findings in those components in which I have found statistically significant evidence that variable costs have been understated, that contain no inframarginal costs,[92] and that are currently regarded either as entirely fixed, or are assumed to have a split between institutional and attributable costs that mirrors that calculated in some other component. These components are identified in Table R-6. The effects of attributing the hidden variable costs associated with components to products are shown in Table R-7.

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[91]   One of the four components is 70 – Rural Carriers – Other Routes, for which the results were questioned by Mr. Glick. As discussed above, his critique appears reasonable.

[92]   I did not have access to all of the non-public files from prior year ACD dockets that I would have needed to recompute inframarginal costs for all of the years covered by the regressions.

## Table R-6: Components for Which the Commission Should Adopt My Results

| Cost Segment Name | Component | Component Name | Reported Attributable Cost | Reported Fixed Cost | Hidden Variable Cost | Truly Fixed Cost | Costing Model Description |
|---|---|---|---|---|---|---|---|
| | | | | *(2014 costs, in thousands)* | | | |
| [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] |
| C/S 2 Supervisors and Technicians | 9 | Supervision of Admin. and Support Activities [\A\ report] | 11,543 | 8,707 | 8,707 | - | Dependent |
| C/S 2 Supervisors and Technicians | 18 | Network Travel | - | 67,326 | 67,326 | - | Dependent |
| C/S 2 Supervisors and Technicians | 33 | Product Specific and Other S & T | 31 | 419,847 | 419,847 | - | 100% Fixed |
| C/S 2 Supervisors and Technicians | 674 | Rural Delivery Carriers | 16,502 | 28,699 | 28,699 | - | Dependent |
| C/S 3 Clerks and Mailhandlers – CAG A-J Offices | 228 | Time & Attendance [\A\ report] | 4,585 | 3,458 | 3,458 | - | Dependent |
| C/S 6 City Delivery Carriers – Office Activity | 44 | In-Office Support Overhead | 490,148 | 37,520 | 37,520 | - | Dependent |
| C/S 7 City Delivery Carriers – Street Activity | 53 | Network Travel Support | - | 191,560 | 70,831 | 120,729 | Dependent |
| C/S 12 Motor Vehicle Service | 86 | City Delivery Network Travel | - | 181,169 | 113,400 | 67,769 | Dependent |
| C/S 12 Motor Vehicle Service | 89 | Other Personnel | - | 15,038 | 14,809 | 229 | 100% Fixed |
| C/S 12 Motor Vehicle Service | 100 | City Delivery Office | 2,309 | 416 | 336 | 80 | Dependent |
| C/S 13 Miscellaneous Local Operations | 114 | Other Local Operations | - | 31,245 | 31,245 | - | 100% Fixed |
| C/S 13 Miscellaneous Local Operations | 125 | Fed. Reserve & Commercial Bank Services | - | 12,710 | 12,710 | - | 100% Fixed |
| C/S 13 Miscellaneous Local Operations | 127 | City Delivery Office | 352 | 64 | 64 | - | Dependent |
| C/S 13 Miscellaneous Local Operations | 131 | City Delivery Network Travel | - | 258 | 253 | 5 | Dependent |
| C/S 13 Miscellaneous Local Operations | 134 | Other Carfare | - | 8,803 | 8,803 | - | 100% Fixed |
| C/S 13 Miscellaneous Local Operations | 136 | City Delivery Office | 719 | 129 | 129 | - | Dependent |
| C/S 13 Miscellaneous Local Operations | 140 | City Delivery Network Travel | - | 526 | 511 | 15 | Dependent |
| C/S 15 Building Occupancy | 168 | Communications | 355 | 85,524 | 81,054 | 4,470 | 100% Fixed |
| C/S 15 Building Occupancy | 169 | Building Projects Expense | - | 185,991 | 179,566 | 6,424 | 100% Fixed |
| C/S 16 Supplies and Services | 175 | Repair Equip. Supplies & Services Excl. ADP | - | 1,513 | 1,513 | - | 100% Fixed |
| C/S 16 Supplies and Services | 179 | Printing & Reproduction | - | 14,208 | 14,208 | - | 100% Fixed |
| C/S 16 Supplies and Services | 246 | Advertising | 114,329 | 60,763 | 49,154 | 11,609 | 100% Fixed |
| C/S 18 Administration and Area Operations | 193 | Area Administration | - | 104,853 | 104,853 | - | 100% Fixed |
| C/S 18 Administration and Area Operations | 195 | Inspection Service Field Support | 13 | 493,113 | 136,341 | 356,772 | 100% Fixed |
| C/S 19 General Management Systems | 219 | Maintenance Technical Support Center | - | 3,963 | 3,963 | - | 100% Fixed |
| C/S 20 Other Accrued Expenses (Servicewide) | 225 | City Delivery Network Travel | - | 33,610 | 33,610 | - | Dependent |
| C/S 20 Other Accrued Expenses (Servicewide) | 1437 | Other Interest | 1 | 37,587 | 37,587 | - | 100% Fixed |
| **Total** | | | 640,886 | 2,028,599 | 1,460,496 | 568,104 | |

Notes and Sources:

[1]-[3]: Components that meet the following criteria:

 - Component is either 100% Fixed or variability is dependent on another component.

 - Component has no inframarginal costs calculated using the corrected FY14-NP10 methodology.

 - Component's fixed cost regression resulted in a positive and significant coefficient on weighted volume.

[4]: Attributable costs reported in the USPS CRA Model Public B Cost Matrix in 2014.

[5]: Other costs reported in the USPS CRA Model Public B Cost Matrix in 2014.

[6]: (Weighted Volume in 2014) x (Slope coefficient of regression), capped at reported other costs.

[7]: [5] - [6].

[8]: Brief description of component's distribution costing model. Categorized by data provided in the FY14 CRA Cost Model CRA control tables and data source (USPS FY14-NP13). Dependent components take variability and distribution from another component. 100% Fixed components are entirely fixed with the exception of small amounts of international or product-specific costs in some components.

## Table R-7: Updated Proposal Two Cost Impacts ($ Millions)

| Mail Class | 2014 Attributable Cost | Hidden Variable Allocation | Proposal Two | % of Current Costs |
|---|---|---|---|---|
| [1] | [2] | [3] | [4] | [5] |
| **Market Dominant Products** | | | | |
| Single-Piece Letters | 5,710 | 218 | 5,928 | 104% |
| Single-Piece Postcards | 266 | 10 | 277 | 104% |
| **Total Single-Piece Letters and Cards** | **5,977** | **228** | **6,205** | **104%** |
| Presort Letters | 4,560 | 177 | 4,737 | 104% |
| Presort Cards | 184 | 7 | 191 | 104% |
| **Total Presort Letters and Cards** | **4,744** | **184** | **4,928** | **104%** |
| Flats | 1,566 | 60 | 1,626 | 104% |
| Parcels | 543 | 20 | 563 | 104% |
| First-Class NSAs | 13 | - | 13 | 100% |
| Outbound Single-Piece First-Class Mail Int'l | 188 | - | 188 | 100% |
| Inbound Single-Piece First-Class Mail Int'l | 249 | - | 249 | 100% |
| **Total First-Class** | **13,280** | **492** | **13,773** | **104%** |
| High Density and Saturation Letters | 370 | 16 | 385 | 104% |
| High Density and Saturation Flats and Parcels | 881 | 35 | 917 | 104% |
| Every Door Direct Mail Retail | 39 | 2 | 41 | 104% |
| Carrier Route | 1,686 | 69 | 1,755 | 104% |
| Letters | 4,895 | 191 | 5,087 | 104% |
| Flats | 2,497 | 98 | 2,595 | 104% |
| Parcels | 103 | 4 | 106 | 104% |
| Standard Mail NSAs | 63 | - | 63 | 100% |
| **Total Standard Mail** | **10,534** | **415** | **10,949** | **104%** |
| In County | 86 | 4 | 89 | 104% |
| Outside County | 2,048 | 80 | 2,128 | 104% |
| **Total Periodicals** | **2,134** | **84** | **2,218** | **104%** |
| Alaska Bypass | 16 | - | 16 | 100% |
| Inbound Surface Parcel Post (at UPU Rates) | 13 | - | 13 | 100% |
| Bound Printed Matter Flats | 134 | 5 | 140 | 104% |
| Bound Printed Matter Parcels | 251 | 10 | 261 | 104% |
| Media and Library Mail | 328 | 12 | 340 | 104% |
| **Total Package Services** | **743** | **27** | **770** | **104%** |
| International Negotiated Service Agreements | 143 | - | 143 | 100% |
| Free Mail - blind, handicapped & servicemen | 40 | 1 | 41 | 104% |
| **Total Market Dominant Mail** | **26,874** | **1,033** | **27,907** | **104%** |
| **Total Market Dominant Services** | **1,331** | **39** | **1,370** | **103%** |
| **Total Market Dominant Mail and Services** | **28,205** | **1,072** | **29,277** | **104%** |
| **Competitive Products** | | | | |
| Total Priority Mail Express | 366 | 14 | 379 | 104% |
| Total First-Class Package Service | 1,155 | 44 | 1,199 | 104% |
| Total Ground | 2,472 | 93 | 2,565 | 104% |
| Total Priority Mail | 5,234 | 237 | 5,471 | 105% |
| Total Competitive International | 1,385 | - | 1,385 | 100% |
| Total Domestic Competitive Services | 359 | 0 | 359 | 100% |
| **Total Competitive Mail and Services** | **10,970** | **388** | **11,358** | **104%** |
| **TOTAL ATTRIBUTABLE COSTS** | **39,175** | **1,460** | **40,635** | **104%** |
| OTHER COSTS | 34,187 | (1,460) | 32,726 | **96%** |
| TOTAL COSTS | 73,362 | | 73,362 | **100%** |

Notes and Sources:

[1]: Mail classes reported in the FY14 Public Cost and Revenue Analysis (PCRA).

[2]: Attributable costs as reported in the FY14 PCRA.

[3]: Additional attributable costs are hidden variable costs predicted from fixed cost regressions and distributed amongst classes used in the fixed cost regressions. Hidden variable costs are included for components that meet the following criteria:

- Component is either 100% Fixed or variability is dependent on another component.

- Component has no inframarginal costs calculated using the corrected FY14-NP10 methodology.

- Component's fixed cost regression resulted in a positive and significant coefficient on weighted volume.

[5]: [4] / [2].

On numerous occasions in the past in testimony before this Commission I have argued for letting the data speak and listening to what the data tell us. I would argue in this instance that when facing a choice between adopting the results of a straightforward and robust analysis of actual data, and continuing to rely upon an a priori assumption made perhaps many years ago with little intervening review or critical scrutiny, the Commission should adopt my recommendations. I think that it would be irresponsible for the Commission to ignore robust statistical evidence of widespread bias in Postal Service costing procedures. The Commission should consider adoption of my recommendations as the best and most practical way forward. This would represent a significant improvement on the demonstrably flawed status quo.

## V. Conclusions

In evaluating the proposals that have been put forward by UPS it is important to recognize that the regulatory structure that was put in place by PAEA and is overseen the by Postal Regulatory Commission exists for an important reason – to prevent abuse. Abuse of customers of market dominant products, who might otherwise be forced to overpay for products they depend upon, that can only be obtained from the Postal Service. Abuse of competitors, who might otherwise find themselves driven from the market by a public enterprise selling products below cost. And abuse of taxpayers, who may well be asked in the not too distant future to provide public resources in order to keep a financially strapped public enterprise afloat.

Concerns over the potential for these abuses are not groundless. The Postal Service enjoys a statutory monopoly over important parts of its business. Economists, regulators and policy makers have long recognized that monopoly power enables and incentivizes abuse, regardless of whether the monopolist is a for-profit private firm or a public enterprise. Economists and regulators have also long recognized that there is a potential for abuse when a firm operates simultaneously in both regulated and competitive markets. As Alfred Kahn, a noted Professor of Economics at Cornell University, former Chairman of the New York Public Service Commission

and Civil Aeronautics Board, and regulatory scholar, pointed out long ago, as long as prices are set "on the basis of some continuing process of allocation of costs between regulated and unregulated operations, there will always be the danger, in principle, of subsidization of the latter by the former."[93] Finally, the Postal Service itself has suggested in its financial filings that it anticipates that if it finds itself in serious financial difficulties, the Federal Government would intervene in such a way that the Postal Service would be able to maintain its operations.[94]

The ability of the Postal Regulatory Commission to discharge its responsibilities and prevent the possibilities outlined above from becoming realities depends critically on the accuracy of the cost information it relies upon. If that information is inaccurate, incomplete or biased, all regulatory bets are off. Without accurate and reliable cost information we have no way of knowing whether market dominant mailers are being overcharged, whether competitive products are being subsidized, or whether the Postal Service's plans for expanding its competitive products business are being conceived and carried out in a financially sustainable and responsible manner.

UPS has proposed two changes to current postal costing practices aimed at improving the quality of the cost information upon which the Commission relies, and bringing that information more closely into compliance with the provisions of PAEA. A number of parties – including most notably the Postal Service – heavily criticized these proposals. Some of these criticisms are technical, relating primarily to whether or not these proposals can be implemented accurately and reliably. Other are normative, arguing against the idea that adoption of these proposals would be good policy or good economics.

I have carefully reviewed the technical criticisms that commenters have offered, and concluded that they are unpersuasive. As I have discussed in detail above, I have considered the points that have been raised, have noted some that have merit, and where appropriate have modified my calculations and recommendations to take these points into account. For the most part, however, I stand by my original conclusions. I continue to believe that the UPS proposals can be implemented in a straightforward and accurate way.

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[93] Alfred E. Kahn, The Economics of Regulation: Principles and Institutions, xxxvi (MIT 1988).

[94] See, e.g., U.S. Postal Service, Annual Report (Form 10-K) at 32 (Dec. 5, 2014) (noting that "it is unlikely that in the event of a cash shortfall, the Federal Government would allow us to significantly curtail or cease operations").

A number of commenters have questioned whether the econometric evidence supporting Proposal Two is strong enough to justify a change in costing procedures. I believe that it is, although I recognize that this is a judgment ultimately for the Commission to make. But as it does, I urge it to consider the alternatives. How sound and reliable is the evidence supporting the judgments and assumptions upon which current costing procedures are based? And if that evidence is found wanting, how long will it take as a practical matter to collect better data and conduct more sophisticated analyses of the many cost categories in which variable costs appear to be understated. The economic environment within which the Postal Service operates is changing rapidly, and the Commission will undoubtedly face many important decisions well before any better results will be available.

Normative criticisms of the UPS proposals focus on the evils and inefficiencies that will result from setting too high a price floor for competitive products. These arguments rest upon the assumption that reported product costs are accurate. Quite apart from the logic of these arguments, the Commission should evaluate the accuracy of this premise, and consider the possibility that current price floors may be set too low. It is not efficient to offer products at the lowest possible price if that price is less than the product's long run cost of provision. Critics of the UPS proposals warn against the possibility of inefficient entry by competitors of the Postal Service. They do not consider the possibility of inefficient entry by Postal Service customers, who may be committing substantial resources to businesses premised on what may turn out to be unsustainable postal products and prices. The Commission needs to consider both sides of this story.

The UPS proposals offer practical and reliable recommendations for improving postal costing that are consistent with the provisions of PAEA. They should be adopted.